

## **DNA: Not Merely the Secret of Life**

Nadrian C. Seeman, Department of Chemistry, New York University, New York, NY 10003, USA, ned.seeman@nyu.edu, 212-998-8395 (t), 212-260-7905 (f).

Structural DNA nanotechnology uses reciprocal exchange between DNA double helices to produce branched DNA motifs. We combine branched motifs to produce specific structures, using sticky-ended cohesion. We have used this approach to make DNA stick-polyhedra, a variety of 2D DNA crystalline arrays and a number of sequence-dependent nanomechanical devices, such as a bipedal walker and a machine that translates DNA sequences into assembly instructions. The walker traverses a sidewalk in either direction as a consequence of the addition and removal of specific strands. The translation machine is based on a device that rotates one end relative to another by a half-turn; this device is also driven in a sequence-specific fashion by the addition and removal of specific strands. We have incorporated this device into a cassette that includes a domain to insert it into a 2D periodic array, along with a robotic arm that is reoriented by the motion of the device. By using atomic force microscopy, we are able to demonstrate that the device is active when it is inserted into the array, thereby laying the basis for a DNA-based nanorobotics.

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